



The University of
Nottingham

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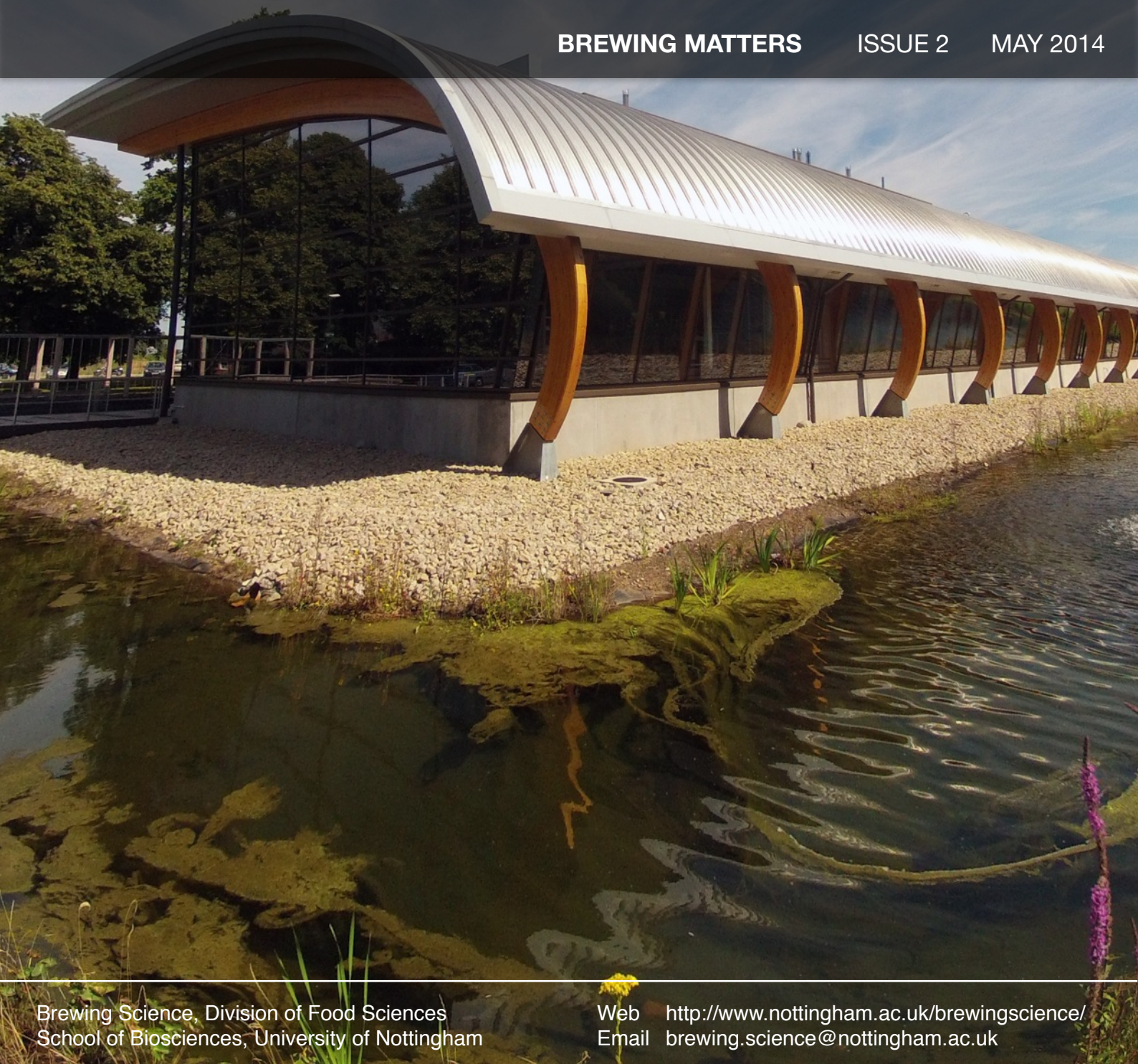
Visit us at

The Brewing Summit 2014 Chicago, Illinois

BREWING MATTERS

ISSUE 2

MAY 2014



Attending the **ASBC & MBAA Brewing Summit 2014** (June 4-7) Chicago, Illinois, USA?

Visit **BOOTH 200** to meet the University of Nottingham brewing staff and students to find out more about brewing science at Nottingham.

Brewing Science at the University of Nottingham

Challenging outstanding value to the brewing industry through internationally recognised excellence in Research and Teaching

People
Our students to find world-class training and research in brewing science, in order to make an impact on the industry.

Facilities

- 100,000 sq ft of research and teaching space
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Our scientists work with the brewing industry to meet the challenges of the 21st century; researching innovative process developments targeted towards increased sustainability, efficient resource usage and increasing safety or efficiency.

Brewing Education
Nottingham has a reputation as the nation's leader in higher level Brewing Science education, achieved through leading learning, a culture of excellence, ground-breaking research methods and links to the brewing and malting industry.

Build your brewing career with us:

- 1 year full time MSc - covers the practical skills, theory and process knowledge required for a career in brewing
- Part-time distance learning MSc - allows you to study at a time and place that suits you
- MSc in Brewing Science - covers the practical skills, theory and process knowledge required for a career in brewing
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Short courses - Advance your skills in a specific area, with all of our courses you can be studied on a part-time basis

Contact us or visit our website to find out more: www.nottingham.ac.uk/brewing

Brewing Courses **Brewing Science**

NEW FOR 2014-15

This one year full time MSc course prepares graduate level scientists and engineers for a career in brewing and its allied industries.

The programme facilitates the development of students' technical, practical and professional skills, with a focus on the industry. Students will gain a deep understanding of the brewing process, from the malting of barley to the production of beer, and will be able to apply this knowledge to the development of new products and processes.

Physical brewing skills are reinforced with technical knowledge in areas such as analytical chemistry, microbiology and process control. The MSc course will also provide you with the opportunity to work on a real-world project, typically in partnership with an industry partner. This will give you the opportunity to apply your knowledge and skills to a real-world problem, and will provide you with the opportunity to work on a real-world project.

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MSc in Brewing Science and Practice

Satisfy your thirst for knowledge... prepare for a career in brewing!

There's never been a better time to study for a career in brewing. The MSc in Brewing Science and Practice is a one year full time MSc course that will give you the opportunity to work on a real-world project, typically in partnership with an industry partner. This will give you the opportunity to apply your knowledge and skills to a real-world problem, and will provide you with the opportunity to work on a real-world project.

Phil Davies

Head of the MSc in Brewing Science and Practice

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Phil Davies

Head of the MSc in Brewing Science and Practice

New for 2014-15: we are launching our full time MSc in Brewing Science and Practice. This one year full time MSc course prepares graduate level scientists and engineers for a career in brewing and its allied industries.

Discover how this new course and our well established e-learning postgraduate courses in brewing science, as well as our extensive research programme, could benefit you and your career.

The University will be well represented at the Summit with staff and students delivering both oral and poster presentations.

To fuel your thirst for the Brewing Summit, here's a taste of what you can expect from some of the University of Nottingham Brewing Science team....

Joanne investigates bubbles and beyond.....



Professor Joanne Hort will be presenting her paper entitled:

Beyond bubbles: the contribution of carbonation to flavour perception in beer and variation in individual response

Contributing authors: Joanne Hort, Rebecca Clark and Sue Francis

This presentation links two studies: one investigating the impact of carbonation on flavour perception and a brain imaging (functional Magnetic Resonance Imaging (fMRI)) study exploring variation in response to carbonation across individuals.

The combined results of these studies not only highlight the impact that changes in carbonation can have on the whole sensory profile of a beer but that perception of these differences varies across different phenotypes and may well lead to considerable variation in beer acceptability. Further research is now needed to evaluate the effect of carbonation on sensory perception and acceptability across different phenotypes across beer consumers.

Chris stresses his yeast at high gravity



Dr Chris Powell will be giving an oral presentation entitled:

The relationship between very high gravity fermentations, yeast stress and key performance indicators

Contributing authors: Seven Zhuang, Alex Mott, Katherine Smart (SAB Miller) and Chris Powell

During the talk, Chris will provide an insight into some of the challenges faced by yeast in fermenting worts of particularly high sugar concentration. In particular, the presentation will describe the relationship between VHG fermentations, carbon flux and ethanol yield. In addition cellular redox potential will be discussed, focusing on cellular damage caused by the production of Reactive Oxygen Species, and the antioxidant response of cells.

Chris has designs on FVs and CTS.....



Professor Chris Boulton will also be giving an oral presentation entitled:

Improved design and operation of cylindroconical fermentation vessels

Current and likely future trends in modern fermentation practise are reviewed. The pitfalls which may be encountered in the management of very large capacity fermentation vessels are discussed together with descriptions and supporting evidence as to how these same potential problems can be viewed as opportunities which if exploited appropriately provide means of manipulating fermentation outcomes to give both consistent cycle times and beer volatile profiles.

To fuel your thirst for the Brewing Summit, here's a taste of what you can expect from some of the University of Nottingham Brewing Science team....

Curtis finds beer flavour an emotive subject...



Curtis Eaton, a PhD student in Professor Joanne Hort's group will also be giving an oral presentation on his work entitled:

Comparing emotional response to sensory properties of beer between the UK and Spain

Contributing authors: Curtiss Eaton, Carolina Chaya (Technical University of Madrid), Rocío Fernández Vázquez (University of Seville), Virginia Fernández-Ruiz (Complutense University of Madrid), Katherine Smart (SABMiller plc.) and Joanne Hort (The University of Nottingham)

This study investigated emotional response differences between cultures in response to eight selected sensory properties of beer. Focus groups of beer consumers in the UK and Spain generated words to describe their emotional response to the chosen samples and used these terms to rate the beers. Linguistic checks and cluster analyses of the responses were used to group terms into emotion categories. Nine emotion categories were defined in the UK and 12 in Spain. These emotion categories were then used by over 100 consumers in each country to assess the selected samples. Using this data, this presentation discusses the need to understand variation in emotional response across cultures in the context of global products.

Calum investigates steam injection technology.....



Calum Holmes, a PhD student with Dr. David Cook's group, will be presenting a poster on:

The impacts of steam injection technology on volatile formation and stripping during wort boiling

Contributing authors: Calum Holmes, Weibke Hense (Diageo), Dan Donnelly (DanDonnellyTek) and David Cook

Recent increases in the price of fossil fuels have necessitated the development of novel and energy-efficient technologies for the brewing industry. Here, one such technology, the Pursuit Dynamics (PDX) wort heater, was evaluated in full-scale brewing trials against an external wort boiling system, to determine potential impacts on key quality attributes of wort and finished beers. The PDX wort heater injects culinary grade steam into the wort flow, creating a multiphase flow and a claimed increase in energy transfer efficiency.

Jörg gets in a spin with gallotannins.....



Jörg Maxminer, another PhD student with Dr. David Cook's group, will be giving an oral presentation entitled:

A comparison of electron spin resonance (ESR) spectroscopy with other staling indices to assess the impacts of brewhouse gallotannin addition on beer flavour stability

Contributing Authors: Jörg Maxminer, Rod White (Molson Coors plc), Jonathan McMaster, David J. Cook

Gallotannins are known to act as metal-chelating agents and their metal complexing properties can lead to a prevention of the Fenton reaction, which plays an important role in the formation of radical oxygen species. Furthermore, there is some evidence that gallotannins can act as reducing agents and radical scavengers. In the present trials, the effect of a brewhouse addition of gallotannins on the flavour stability of a lager-style beer was investigated. The effects of the different additions of gallotannins were monitored at key points of the production process and through to the final beer. Analyses included the measurement of antioxidant capacity via ESR spectroscopy; staling aldehydes via solid phase micro extraction (SPME)-GC-MS with on fibre derivatization; thiobarbituric acid index (TBI); metal ion content via inductively coupled plasma mass spectrometry (ICP-MS); sulphur dioxide via distillation; and sensory analysis.

We hope this has whetted your appetite for brewing science at the University of Nottingham... ..

Don't forget come and visit **Booth 200**

Dr. David Cook, Linda Vickerstaff, and Wendy Box will also be there:

